REF 3

EP0653798

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PATENT ABSTRACTS OF JAPAN

(11)Publication number : 07-192770
(43)Date of publication of application : 28.07.1995

(51)Int.Cl. H01M 10/46
H01M 10/44

(21)Application number : 06-269583
(22)Date of filing : 02.11.1994

(30)Priority
Priority number : 93 4337786 Priority date : 05.11.1993 Priority country : DE

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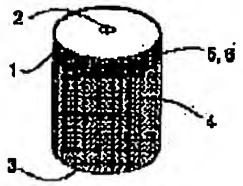
(54) BATTERY UNIT HAVING VOLTAGE CONVERTER

(57)Abstract:
PURPOSE: To simply obtain a battery unit having a constant voltage by forming the battery unit as a specified unit, in a battery unit having a battery and a voltage converter to generate a constant output voltage.
CONSTITUTION: In a battery unit having a battery 4 and a voltage converter 5 to generate a constant output voltage, the battery 4 and the voltage converter 5 are made to be one mechanical unit. If necessary, the battery 4 is made to be a re-chargeable battery and a charging circuit 6 to charge the battery is contained in the mechanical unit. Moreover, the battery 4, the voltage converter 5, and if necessary a charging circuit 6 are housed in one housing and conductive contacts 2, 3 to take out the output voltage of the voltage converter 5 are holds in the housing.



battery + voltage regulator } in 1 unit

But no capacitor

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the cell unit which has an electrical-potential-difference converter for fixed output voltage generating.

[0002]

[Description of the Prior Art] A cell especially a recharge possible lithium ion battery, and a lithium-polymer battery have the fault that the electrical potential difference to which electric power is supplied by these cells decreases as a cell discharges. Therefore, generally these cells cannot be used for the electronic instrument which needs fixed operating voltage in spite of a high energy density. Since fixed output voltage is generated, the 3608082nd specification C No. 2 of a Germany patent has the combination of a rise/down converter, and is indicating the circuit arrangement which can be switched so that a down converter or an up converter may be operated. For example, when the input voltage of this combination given from the fully charged cell is higher than a rated output electrical potential difference, it is made to decrease output voltage using a down converter. when input voltage decreases according to a cell being alike gradually and discharging, it becomes impossible for a down translation mode to already keep fixed output voltage suitable in a predetermined moment A rise translation mode is then started.

[0003] Generally, such an electrical-potential-difference converter is constituted as a switch mode power source, in order to make power loss by the result of electrical-potential-difference conversion into the minimum. However, such a switch mode power source has a possibility of causing the active jamming which radiated interference is not desirable or cannot permit especially in the case of a small electric appliance like a portable radio. Moreover, the capacity of an electrical-potential-difference converter must be decided depending on the number of the output voltage to need and cells.

[0004] The purpose of this invention is easy in the ability to do, and offers the cell unit which has a fixed electrical potential difference. This invention is characterized by constituting the cell and electrical-potential-difference converter of a format which

were mentioned above as one mechanical unit. According to this invention, since a cell and an electrical-potential-difference converter constitute one mechanical unit, these can be contained as one functional block in standard housing of arbitration. Higher output voltage or the larger output current can be easily acquired by arranging a cell / electrical-potential-difference converter unit to a serial or juxtaposition if needed.

[0005] In the case of a recharge possible cell, if the mechanical unit of a cell and an electrical-potential-difference converter is equipped with the charge circuit for charging a cell further, it is especially advantageous.

[0006] The mechanical unit of a cell and an electrical-potential-difference converter can be made into the configuration and dimension of a standard cell a cell, an electrical-potential-difference converter, and by holding a charge circuit in one common housing, if , and forming the conductive contact for taking out the output voltage of an electrical-potential-difference converter in this housing. The user-friendliness of this cell that made the cell and the electrical-potential-difference converter one does not differ from other cells. By having incorporated the electrical-potential-difference converter in cell housing, an electrical-potential-difference converter is covered electromagnetic. Therefore, an additional electric shielding means is not needed as compared with the electrical-potential-difference converter held on the printed circuit board of the electric apparatus which should be driven. However, the greatest effectiveness of the cell unit which built the electrical-potential-difference converter of this invention into one is exchangeable like the conventional battery or a dry cell.

[0007] The battery which built the electrical-potential-difference converter into one has the advantage that the difference of the output voltage in the condition of having followed, for example, having charged completely like a lithium cell, and the condition under discharge can also use a large cell. Generally such a cell has larger capacity/volume ratio than a conventional cell like a nickel-cadmium battery. Thus, by having made the cell and the electrical-potential-difference converter into one, it has the higher discharge current by the same volume, and the recharge mold cell which has a fixed output is obtained. When using housing of the same dimension, the cell unit of this invention can be applied to the existing electronic equipment as it is.

[0008]

[Example] Drawing 1 shows the appearance of the housing 1 of one example of the cell unit by this invention. The appearance of housing 1 supports the standard cell which has an anode plate 2 and the cathode 3 of the housing bottom. A lithium cell 4 is held in some housing 1, and the electronic device of the electrical-potential-difference converter 5 and a charge circuit 6 is held in other parts of housing 1.
[0009] In drawing 2 , the same sign as drawing 1 shows the same components as drawing 1 . It connects with the lithium cell 4 which had the input terminal 51 of the electrical-potential-difference converter 5 accumulated, and the output voltage of this converter is impressed to the anode plate 2 of a cell unit from an output terminal 53. The cathode of a lithium cell 4 is led to the cathode 3 of a cell unit. The negative-supply-voltage terminal 52 of the electrical-potential-difference converter 5 is also connected to the cathode of a lithium cell 4. When the anode plate 2 of a cell unit is connected to a charge circuit 6 and this charge circuit is given with a polarity with a proper charge electrical potential difference, it is the charging current IL. The anode plate of a lithium cell 4 is supplied directly.
[0010] Drawing 3 shows the discharge voltage curve about a lithium cell. When charging 100%, the electrical potential difference between the terminals of a lithium cell is 4.2V. About the input voltage between 3.8V and 4.2V (the range B of drawing 3), the electrical-potential-difference converter 5 is constituted for an electrical potential difference so that it may be made to decrease to about 3.6V. In the range between 3.8V and 3.4V (the range C of drawing 3), the electrical potential difference impressed with a lithium cell 4 is impressed to an anode plate 2 as it is, without carrying out electrical-potential-difference conversion. When the electrical potential difference of a lithium cell 4 finally falls to less than [3.4V] as discharge progresses (the range D of drawing 3), an electrical-potential-difference converter switches to rise conversion, and generates about [3.6V] output voltage. Thus, about [3.6V] output voltage is obtained between the output terminals of a cell unit independently of a charge condition.
[0011] Generally, output voltage is made into 1.2V or the integral multiple of those in order to give the standard cell and the compatibility of 1.2V.
[0012] The mode of operation which outputs the output voltage of a lithium cell 4 as it is depending on the circuitry of an electrical-potential-difference converter may be omitted. An electrical-potential-difference converter corresponds to the combination of the rise/down converter which is described in this case by said 3608082nd

specification C No. 2 of a Germany patent. However, output voltage in case the cell or battery, for example like a nickel-cadmium battery used until now discharges changes with charge conditions, and since it is designed so that the electronic instrument which should be driven may cope with such voltage variation, it is not necessary to make electrical-potential-difference permanence of the electrical-potential-difference converter 5 into a strict requirement. Generally about 10% of voltage variation is permitted.

[0013] By the field used, this contractor may determine whether an electrical-potential-difference converter should only be designed as a down converter, or it should only design as an up converter.

[0014] A charge circuit 6 is committed in order to charge a lithium cell 4. The higher electrical potential difference for this purpose is impressed to the electrode of a cell unit. A charge circuit 6 is operated and this higher electrical potential difference is the charging current IL. It flows in a battery 4. When it simplifies most, a charge circuit 6 is equipped with the diode which operates to the forward direction in charge mode. In charge mode (the range A of drawing 3), the electrical-potential-difference converter 5 is suitably made into cutoff mode so that the charging current from an anode plate 2 may not flow to the electrical-potential-difference converter 5 through the output terminal 53 of the electrical-potential-difference converter 5.

CLAIMS

[Claim(s)]

[Claim 1] The cell unit characterized by forming said cell and an electrical-potential-difference converter as one mechanical unit in the cell unit which has an electrical-potential-difference converter for generating a cell and fixed output voltage.

[Claim 2] The cell unit which said cell is a recharge possible cell and is characterized by including a charge circuit (6) for said mechanical unit charging said cell (4) in a cell unit according to claim 1.

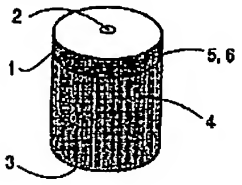
[Claim 3] The cell unit characterized by said electrical-potential-difference converter (5) and having [said cell (4) and] the conductive contact (2 3) with which a charge circuit (6) is contained in one common housing if, and this housing outputs the output voltage of an electrical-potential-difference converter to the exterior in a cell unit according to claim 1 or 2.

[Claim 4] The cell unit to which said electrical-potential-difference converter is characterized by being the combination of a rise/down converter in a cell unit according to claim 1, 2, or 3.

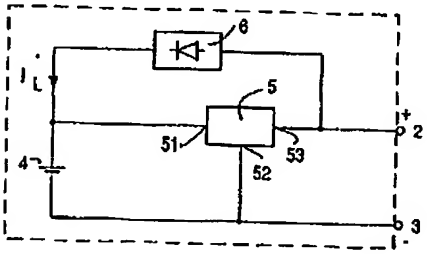
[Claim 5] The cell unit characterized by being the integral multiple whose output voltage is 1.2V in a cell unit according to claim 1, 2, 3, or 4.

DRAWINGS

[Drawing 1]



[Drawing 2]



[Drawing 3]